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FARMERS' BULLETIN 1183
UNITED STATES DEPARTMENT OF AGRICULTURE

THE CARE OF LEATHER



This bulletin contains suggestions for a judicious selection of articles made from leather and tells how to care for them in order to obtain the maximum service.

Contribution from the Bureau of Chemistry

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THE CARE OF LEATHER.

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INTRODUCTION.

FOR several years the supply of leather in this country has barely met the demand, even with an annual importation of hides and skins nearly equal to the domestic supply. This condition, due largely to extravagance, to fads, and to neglect, makes it highly important that the American people see to it that their boots and shoes, harness, and machine belts last as long as possible.

As a nation, we buy some 300,000,000 pairs of shoes a year. Our needs could be supplied by 250,000,000 pairs, if they were well cared for and kept in repair. As a rule, harness lasts the farmer for less than 10 years. If the right kind of attention were given to its manufacture and use, it should last for 20 years or longer. Belts for driving machinery often become impaired, if not useless, within a few years, even on straight drives. A good leather belt, suited to the work to be done and properly installed, will run for from 10 to 30 years.

Every pair of shoes, every machine belt, and every piece of harness that is allowed to go to waste or that is not made to yield full service must be needlessly replaced by other leather, thus keeping prices high. Including leather made from imported hides, the leather supply in the United States is large enough to provide every one with an average of two or even two and one-half pairs of shoes a year and to keep them in repair, as well as to replace all harness and machine belts every 10 or 20 years, at reasonable prices. It is doubtful, however, whether the leather-making materials produced in this country, supplemented by those which can be imported, will suffice

to meet the demand for three or more pairs of shoes a year for each person, for a new harness every 2 or 5 years, and for new machine belts every 5 or 10 years, as is now too frequently the requirement.

The suggestions and directions given in this bulletin, if followed by the public, will go far toward conserving the supply of leather, and materially reduce the individual expenditures for leather goods.

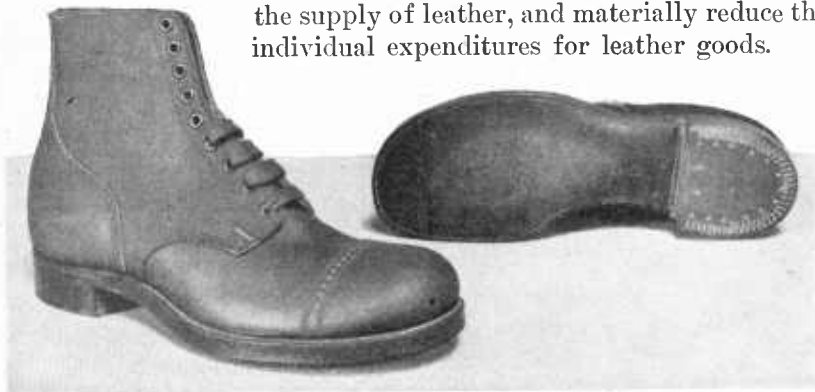


FIG. 1.—Shoes for Every-day Wear.

A serviceable type, insuring maximum comfort and efficiency for the wearer, and well adapted for use in city and country alike. After a thorough study the War Department adopted this style of shoe for the U. S. Army.



FIG. 2.—Comfortable, Sensible Shoes Mean Bodily Comfort and Safety.

Heels, low and broad; the body is properly supported. Toes, roomy and comfortable; ill humor from pinched toes and aching corns and bunions is prevented. Soles, moderately thick; service and protection are provided.

BOOTS AND SHOES.

The wasting of a single shoe a year by each person in the United States costs the country at least \$250,000,000 annually, at the present prices of shoes. To prevent this loss, it is imperative that shoes be selected with care and that they be kept in good condition.

SELECTION.

Buy shoes on which the manufacturer is willing to stamp his name and address. If they do not wear well, try another make next time. Select shoes that fit and that permit standing, walking, and quick turning in comfort and safety, with no danger of slipping, turning the ankle, or falling (figs. 1 and 2).

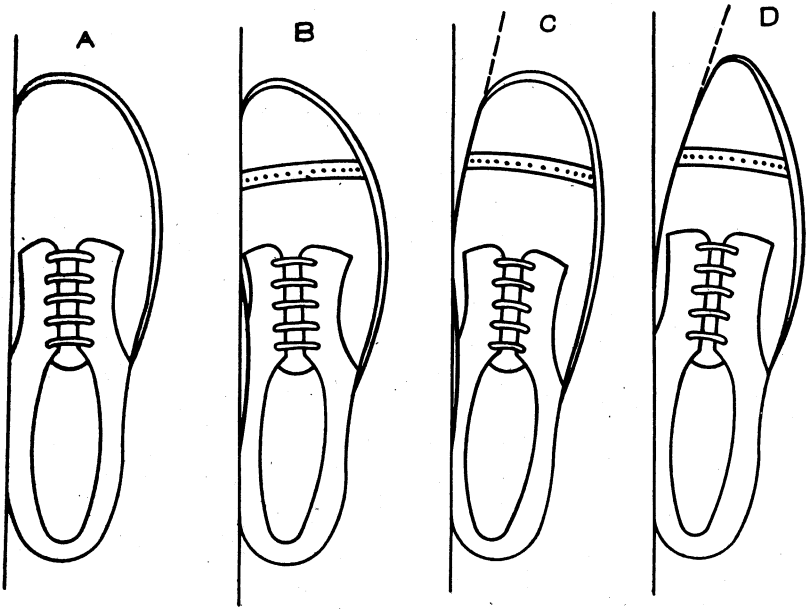


FIG. 3.—Comparison of Shoes Made on Proper and on Improper Lines.

A and B—Satisfactory. Note the straight inner line and rounded toe characteristic of the normal foot. C and D—Objectionable. Note the curve outward from the naturally straight inner line of the foot; also the too pointed toe of D. (Photograph from the Army Medical Museum.)

Shoes will not retain their shape and good appearance unless they fit properly (fig. 3, A and B). Shoes with heels which throw the wearer's weight upon the toes or are too small to support solidly the weight of the body lose their attractive appearance and their serviceability much more quickly than those with heels which permit the feet to maintain their normal position in standing and walking. Moreover, shoes which are too short or do not fit in some other respect, as well as those which force the body into unnatural positions, are uncomfortable and give rise to foot trouble and nervousness, thus lowering the capacity of the wearer both for effective

work and for pleasure (fig. 3, C and D, and fig. 4). Heels which are too small or too high or are placed forward under the foot are a source of expense because of their tendency to become worn down on one side, which causes excessive strain on the seams and uneven wear on both the soles and uppers. Of more importance, however, is the fact that such heels are a constant menace to the health of the wearer, and often cause serious injury through slipping and falling. Rubber heels, the use of which has become very general, are often advisable for city wear. They lessen the jar in walking, and, as a rule, last longer than leather heels for city wear.

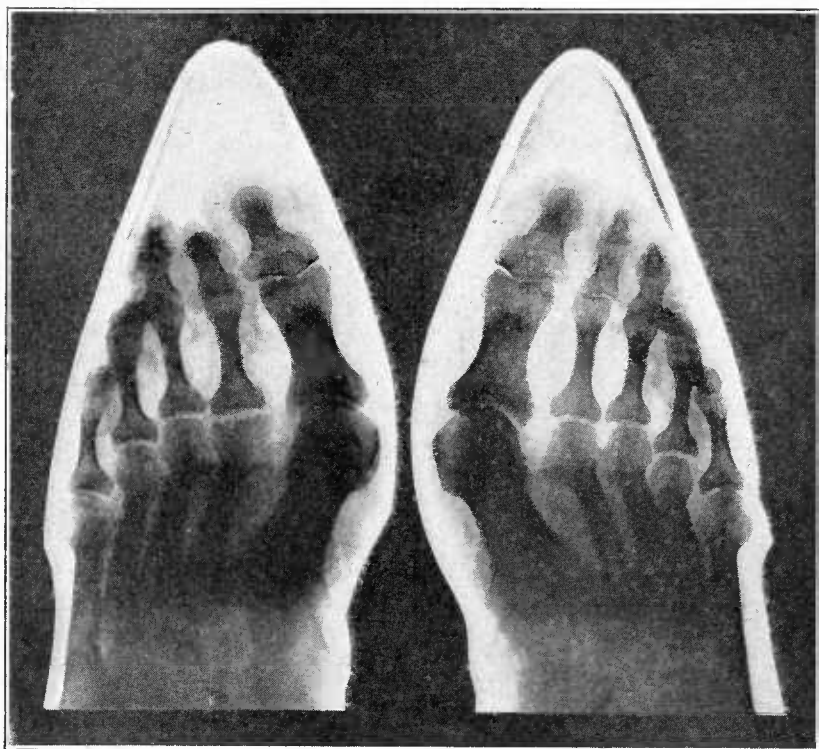


FIG. 4.—Effect of Shoes on the Bones of the Foot.

The bones of the foot bent into unnatural and often painful positions by improperly shaped and ill-fitting shoes. (Photograph from Army Medical Museum.)

Welt shoes can be resoled or half soled by sewing more easily and neatly than other kinds. In this type of shoe, a strip of leather called the welt is used to join the soles to the upper. The welt is sewed to the inner sole and upper along its inner edge and to the outer sole along its outer edge. It should extend for at least a quarter of an inch beyond its juncture with the upper, and preferably should be smooth. Narrow welts, and welts finished by wheeling (fig. 6) often break and make repairs more difficult and expensive.

CARE.¹

Do not discard shoes as soon as they begin to show signs of wear. Proper care means a reduction in shoe bills of from 25 to 50 per cent, and at the same time insures good-looking footwear. Keep your shoes in repair, and wear them as long as they are serviceable. An economical plan is to have two pairs which are worn on alternate days, thus permitting each pair to become thoroughly dry between the periods of wearing them. Shoe trees are of great assistance in retaining the original shape of the shoe. Shoes designed for farm or other heavy out-of-door work should be kept clean and greased, while those for street wear should be kept clean and polished.

Send your boots or shoes to the shoemaker for repairs the minute they begin to rip at the seams, the upper leather cracks through at a crease, a heel becomes twisted out of shape, or the heel lift wears through. Especially avoid wearing away the welt. Any delay may mean that the shoe soon will be so badly damaged that it is no longer worth repairing, and from \$2 to \$5 has been lost by neglect (figs. 7 and 8).

Ripped seams in the uppers can frequently be stitched at home, and a handy man, with the aid of a repair kit, can put on new heel lifts, rubber heels, half soles, and metal heel or toe plates without much difficulty. The equipment necessary for repairing shoes in-



FIG. 5.—Effect of Shoes on the Bones of the Foot.

The nearly normal bone structure of a foot in a correctly shaped and properly fitting shoe. (Photograph from Army Medical Museum.)

¹ See also Farmers' Bulletin 1089, p. 28.

cludes a last holder, 3 or 4 iron lasts of different sizes, a shoemaker's hammer, a pair of pincers, one or two leather knives, a leather rasp or file, awls, nails for soles and heels, flax shoe thread, bristles, and wax. Made-up repair kits, containing all the necessary articles, or the separate articles, can be purchased from dealers in hardware or shoe findings. Waxed linen or flax thread should always be used for sewing, the flax being stronger and more durable than cotton, and the wax making the thread more water-resistant and the stitch holes more impervious to water.

DRYING.

Boots and shoes are peculiarly subject to damage after they have become soaking wet while being worn. The wet leather is soft and therefore readily stretches out of shape. The stitches cut through the wet leather much more easily than through dry leather, and wet soles and heels wear away rapidly.

Great care must be taken in drying wet boots and shoes, for they often burn before it seems possible. Moreover, if dried too fast and without proper attention, they shrink, becoming hard and misshapen.

To dry wet boots and shoes properly, first wash off all adhering mud and grit with tepid water, and, in the case of work or rough shoes, at once oil or grease them with one of the preparations described on page 11. Then straighten the counter, heel, vamp, and top to the proper shape, and stuff the shoes with crumpled paper, which helps them to hold their shape and shortens the drying period. Finally, set the shoes aside in a place that is not too warm and allow them to dry slowly. Wet leather burns very easily, much more readily than dry leather. If it becomes hotter than the hand can bear, it is almost sure to burn. The shoes should not be worn until they have become thoroughly dry.

OILING AND GREASING.

The rational use of the proper kind of oil or grease will greatly increase the wear of shoe leather. Boots and shoes, especially those worn on the farm, in the forest, and in mines, should be oiled or greased whenever the leather begins to harden or dry, or when it does not turn water well. The purpose of doing this is to make the boots last longer, and to keep the feet dry and comfortable.

Before oiling or greasing, brush the boots or shoes thoroughly to remove all the dirt and dust, warm them carefully, bearing in mind the danger of burning them if they are wet, and apply warm oil or grease with a swab of wool or flannel. The oil or grease should never be hotter than the hand can bear, and it should be rubbed well

into the leather, preferably with the palm of the hand. Special care should be taken to work the grease in well where the sole is fastened to the upper, as the water soaks in most frequently at that place. After being greased the shoes should be left to dry in a warm, but not hot, place.

Among the best oils and greases for this purpose are neat's-foot, cod, and castor oils, tallow, and wool grease, or mixtures of them. Cylinder oil and vaseline or petrolatum also are good, but are improved by being mixed with animal oils or greases. The application of any oil or grease darkens light-colored or russet leather. Where this is objectionable the shoes should be kept in good condition by frequent polishing.



FIG. 6.—Shoe with Wheeled Welt.

These corrugations, produced by "wheeling," weaken the welt and render defective stitching less apparent.

Castor oil probably is the most satisfactory oil for use on shoes that are to be polished. Apply the oil lightly to the clean, dry shoe, and rub it into the leather until dry. If the application is light the shoe may be polished immediately, although it is better to wait until the next morning. If the oil is applied too heavily it will be difficult to polish the shoes satisfactorily even after two or three trials.

WATERPROOFING.

It is often desirable, especially at certain seasons of the year, to grease boots and shoes heavily to make them water resistant, since it is highly important both for health and for effective work to keep the feet warm and dry. The ideal shoe would permit the perspiration from the foot to pass out, at the same time preventing the entrance of water. Such a shoe, however, does not exist.

Dependence for keeping the feet dry must, then, be placed on rubber overshoes and boots or waterproofed leather shoes and boots. Although rubber overshoes and boots will keep water out, they also keep the perspiration in.

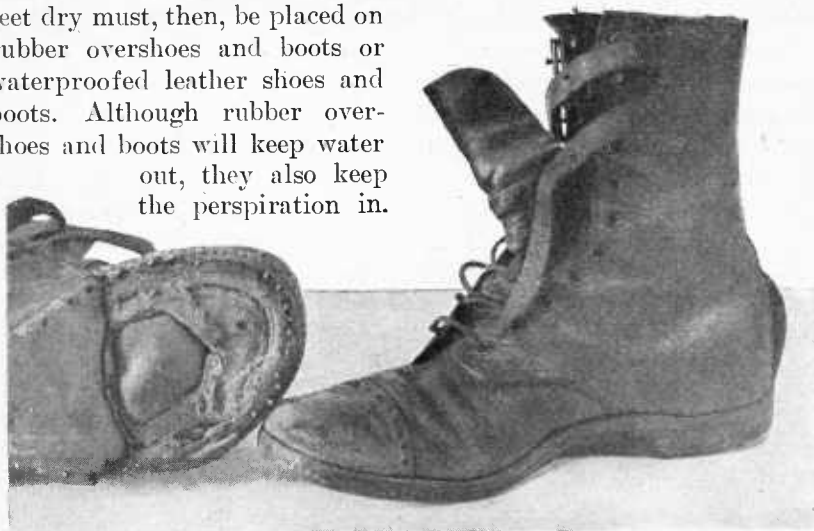


FIG. 7.—Repairing always should be done in time, certainly before the welt and insole become worn. Ordinarily it does not pay to repair shoes like these.

Moreover, they are cold in winter and hot in summer. For these reasons, as well as because of excessive weight, rubber footwear is objectionable to many people.

Some boots which are well made of best quality leather and which are properly treated are practically waterproof under most conditions of wear. Nearly all of the leather shoes and boots made nowadays, however, when treated to make them water resistant, allow the entrance of some water, owing principally to the difficulty of completely waterproofing the seams. Such footwear can not be expected to keep the feet perfectly dry if worn for a long time in wet weather,

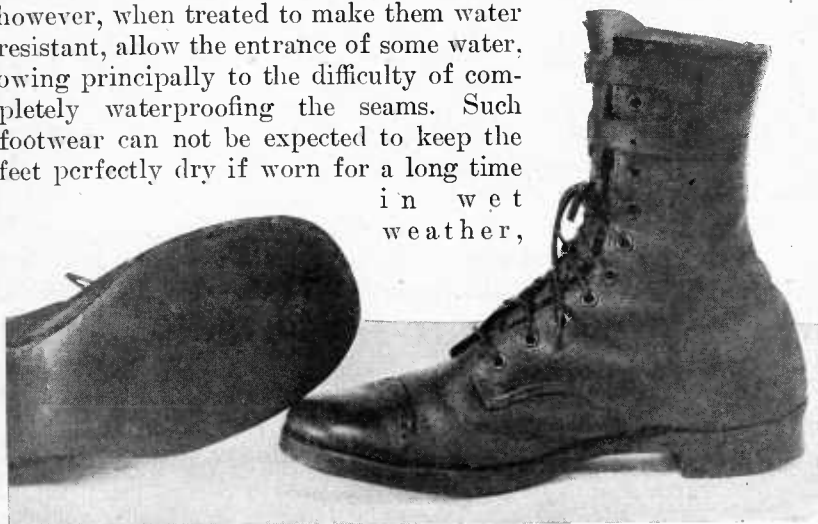


FIG. 8.—Nevertheless, for \$2 these shoes were put into excellent shape and were worn for another three months.

nor will it take the place of rubber overshoes or boots for walking in water, slushy snow, or very soft mud.

Waterproofed leather boots and shoes are very satisfactory, however, for protecting the feet during rain or snowstorms and for use on wet pavements or wet ground where there are no deep puddles. They also keep the perspiration in, but are not as objectionable as rubber in this respect.

In summer the grease used for waterproofing shoes and boots should be harder than that used in winter. Since heavily greased shoes have a tendency to cause the feet to perspire and swell in hot weather, and there is also less need for water-resistant shoes in summer than in winter and spring, it is rarely advisable to put as much grease on the shoes at that time of the year. In summer, the quantity of grease used should not exceed the amount that the leather will take up without leaving its surface greasy. In winter, especially if it is desired to secure the maximum water resistance, a mixture of grease and oils which is not too hard when cold is required, while more of this grease than the leather will absorb may be used. An excess will do no harm and will make the leather more water resistant.

WATERPROOFING FORMULAS.

For waterproofing boots and shoes, nothing better than the following simple formulas is known to the Department of Agriculture. While the department believes that these formulas do not infringe on any existing patents or pending applications for patents, it can assume no responsibility in the matter.

Formula 1.

Neutral wool grease	.....	ounces	8
Dark petrolatum	.....	do	4
Paraffin wax	.....	do	4

Formula 2.

Petrolatum	.....	pound	1
Beeswax	.....	ounces	2

Formula 3.

Petrolatum	.....	ounces	8
Paraffin wax	.....	do	4
Wool grease	.....	do	4
Crude turpentine gum (gum thus)	.....	do	2

Formula 4.

Tallow	.....	ounces	12
Cod oil	.....	do	4

In each case the ingredients of the mixture should be melted together by warming them carefully and stirring thoroughly. Better penetration is obtained if the grease is applied warm, but it should never be hotter than the hand can bear.

Grease thoroughly the edge of the sole and the welt, as this is where shoes leak most. The sole should also be thoroughly impregnated with the grease, thereby increasing its water resistance, durability, and pliability. The sole can be most conveniently waterproofed by letting the shoe stand in a shallow pan containing enough of the melted material to cover the entire sole. Rubber heels, however, should not be allowed to stand in the grease, as it softens the rubber.

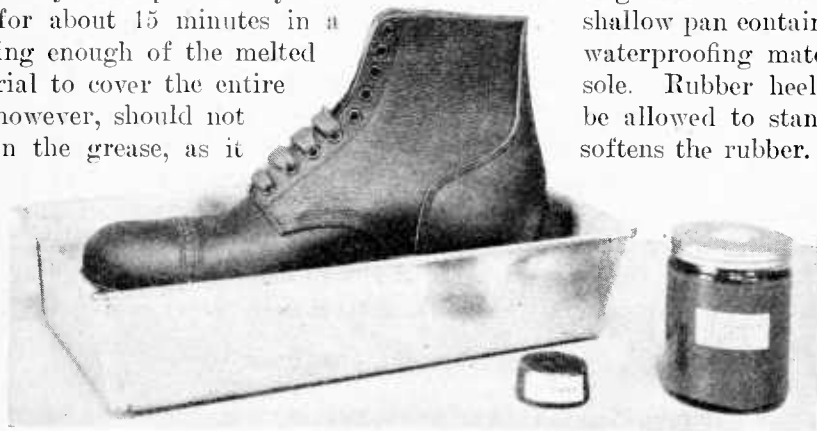


FIG. 9.—All You Need for Waterproofing Shoes.

HARNESS.

Harness made of good leather and heavy enough for the work required of it will last for many years if cared for properly. It is more economical to buy harness that is too heavy than to buy that which is too light for the work. With good care, harness of the proper weight and quality will last at least 15 years, and in many cases harness used on the farm has been in service for 25 years or longer (fig. 10). On the other hand, the Department of Agriculture has received many reports, especially from the Southern States, showing that harness lasts only from 2 to 5 years. This should not be so. It means that the harness used is too light, is of poor quality, or is not cared for properly.

SELECTION.

Select harness with care. See that it is well made. Make sure especially that the reins, breeching, holdback straps, tugs or traces, belly bands, and yoke straps are sufficiently heavy and strong for the work required. A runaway team can not be controlled with weak reins, nor will weak tugs and straps stand heavy work.

No portion of the harness should show cracks on the grain side when the leather is sharply bent. New leather that does this is worth-

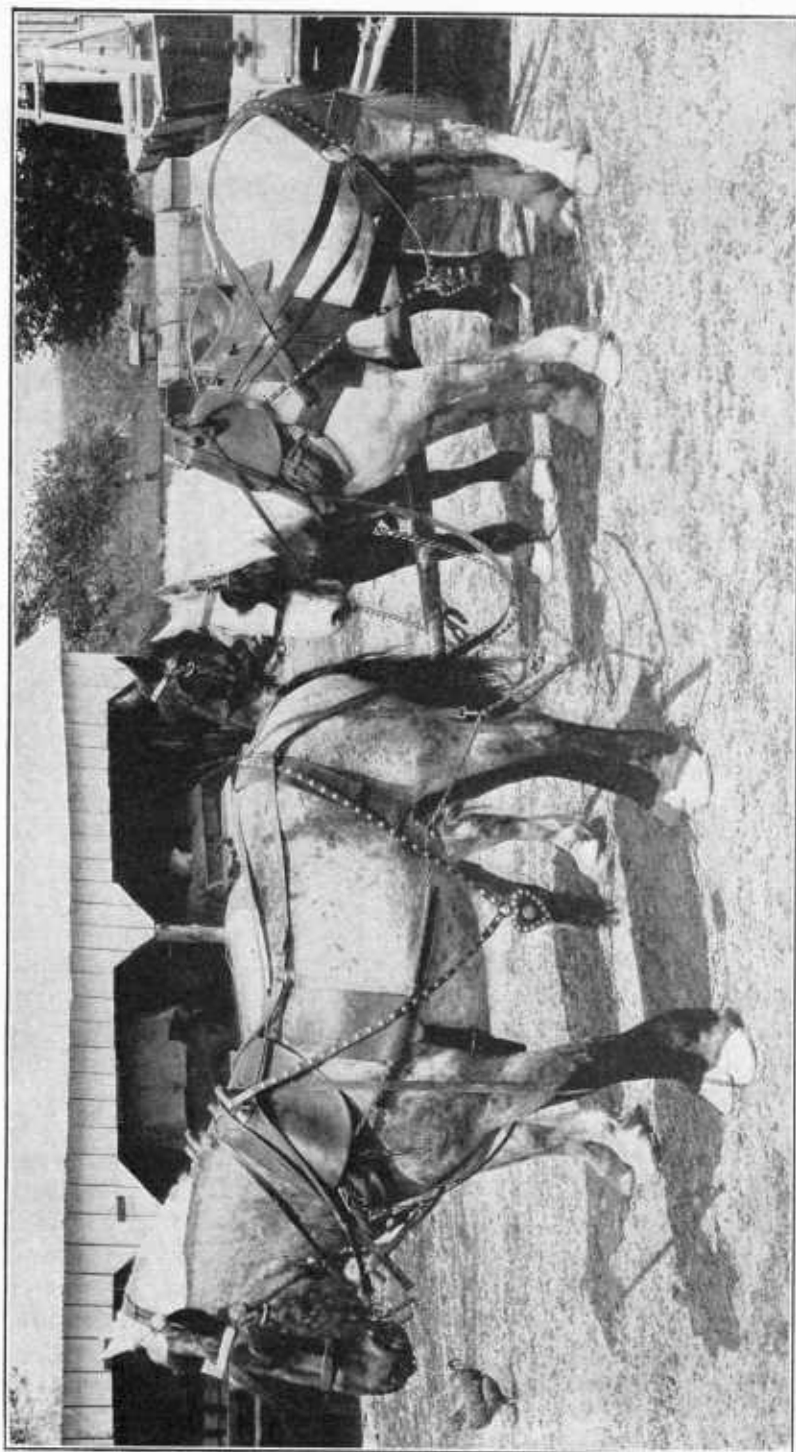


FIG. 10.—Harness Used on a Farm for 34 Years.

It has been kept clean and oiled frequently with neat's-foot oil. As a result, it shows no signs of deterioration and should last for 20 years longer. Proper selection and care did it.

less for harness or belts, and old harness or belts showing cracks are deteriorating and will soon fail if subjected to heavy loads. Since strong acids prove injurious to harness leather in time, it is to the purchaser's best interest to buy harness which does not contain such materials. Grease in moderate quantities, up to 20 per cent, protects, preserves, and strengthens harness leathers. More than 25 per cent is not necessary.

CARE.

Neglect of harness results in injury that greatly lessens its durability. The sewing, which should have been done with strong waxed linen thread, must be kept in good condition. All buckles should remain solidly in place. It is advisable to wash and oil harness frequently.

For washing, use tepid water, a neutral soap, such as castile or white toilet soap, and a sponge or fairly stiff brush. Hardened grease is very conveniently removed by scraping with a dull knife. Rinse in clean, tepid water, and allow the harness to hang in a warm place until it is no longer wet, but still damp. Then oil it and leave it in a warm place for 24 hours before being used. Harness should be oiled or greased while still damp; otherwise, it may take up so much grease that it will pull out of shape or take up sand and grit, which will injure it, as well as spoil its appearance. Harness should never look or feel greasy.

Neat's-foot or castor oil or a mixture of these with wool grease is good for driving harness. For heavy harness use a mixture of tallow and cod oil, or neat's-foot oil and tallow, or a mixture of any or all of these with wool grease to make a paste having about the consistency of butter. Apply the grease lightly to driving harness and liberally to work harness. Rub the oil or grease, warm to the hand, thoroughly into the leather while it is still damp from the washing. After the harness has hung in a warm room overnight, remove, with a clean, dry cloth, the excess of oil which the leather is unable to take up.

In case the oils and greases mentioned are too expensive or too difficult to obtain, they may be mixed with not more than an equal quantity of heavy mineral oil, petrolatum, or paraffin, or a mixture of these substances.¹ In no case, however, should any grease or other preparation containing mineral acids or oxalic acid be used on harness or belts. No matter how highly such preparations may be recommended, avoid them. Their use will hasten the rotting of the leather.

Should any part of your harness break under circumstances that indicate leather of poor quality, you are asked to send about 1 foot

¹ Castor oil will not mix well with mineral waxes, such as petrolatum or paraffin.

of the broken strap to the Bureau of Chemistry, United States Department of Agriculture, Washington, D. C., with a full and careful statement as to how long you have had the harness, what care you have given it, and the conditions under which it broke.

DRIVING BELTS.

SELECTION.

Belts for driving machinery should be selected with particular care, bearing in mind the character and continuity of the work each is to do. The selection of the proper belt for a given installation involves consideration of load, width, thickness, length, speed, ply, size of pulleys, and horsepower. Ordinarily the competent belt maker's advice as to the proper belt for a given installation should be followed.

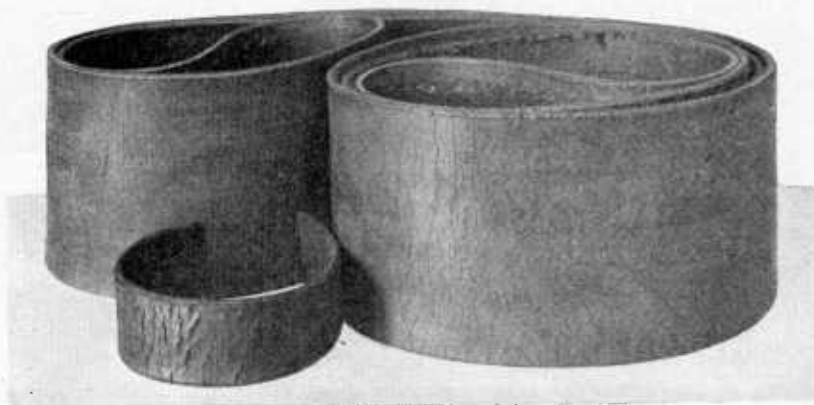


FIG. 11.—Result of Lack of Care or of Poor Quality of Leather Belting.

Carelessness causes belts and straps to quickly become cracked and weak, which results in much annoyance and delay from frequent breaking.

It is more economical to use a belt that is too wide than one that is too narrow. If the belt is not suited to the work it gives trouble continually, causing shutdowns of machinery that will quickly cost more in loss of time and wages than many good belts. A belt should always be sufficiently flexible to cling closely to the smallest pulley over which it passes. If it does not, it is not adapted to the work, and, in addition to loss of time due to frequently running off, it may crack on the grain within a short time, thus weakening it as well as causing it to stretch (figs. 11 and 12). Furthermore, it will slip on the pulley, thus losing power and becoming heated, which hastens its deterioration. A belt should run slack rather than tight.

Note carefully the condition of the belt when it is new. While it evidently contains grease it is not greasy. It should be flexible and feel firm, mellow, and smooth. An effort should be made to keep the

belt as nearly as possible in its original condition. Do not allow it to become hard and harsh. It will run from 10 to 25 years or longer, provided, of course, it was well made from good material, is adapted to the work, and is kept in good operating condition (fig. 13). Heavy, wide belts last longer than small belts.



FIG. 12.—Result of Inattention and Poor Installation of Belting.

Unless kept clean, mellow, and in good condition with suitable belt dressings, a belt will soon look like this.

CARE.

Satisfactory service can not be expected from a belt that is too light or too heavy or otherwise not adapted to the work. Neither can a belt be made to give satisfactory results if it slips, does not run true, is not properly laced, is run too loose or too tight, is subjected to rapidly alternating light and heavy loads, is alternately wet and dry, is run on pulleys that are not true or are too small for the weight and thickness of the belt, or is neglected and allowed to deteriorate for lack of grease. Keep the belt clean and free from excess of grease and belt dressings. Unless frequently wiped off, dust and dirt work into the belt and damage it. Never let the belt remain dirty or dusty overnight, nor leave an excess of grease or oil on it.

BELT DRESSINGS

A good belt grease or dressing is one which gives the belt sufficient flexibility and at the same time causes it to cling to the pulley, but does not subsequently stiffen or injure the belt in any way. Among the best belt dressings are mixtures of cod and neat's-foot oils with tallow and wool grease, free from mineral acid.

Clean the belt well, especially on the pulley side, by washing it with warm water and a good neutral soap, such as castile or white toilet soap, and, if necessary, scrape it on the pulley side to remove dressing and dirt that may be caked on it. Wash rapidly, and do not permit the belt to become wet, as it will then stretch and slip. Dressings never should be allowed to cake on the belt because caking causes the belt to run unevenly and also injures it. The dressing should be liquid at ordinary temperature, should be applied to the outside of the belt while it is at rest, and should be allowed to soak in overnight. It should be applied very evenly and should be rubbed in with cotton waste, a piece of felt, or with some similar material. If absolutely necessary, a very light dressing may be applied to the pulley side of the belt, using cotton waste or felt lightly greased with the belt dressing. Even distribution and penetration should be secured as far as it is possible to do so. Avoid rosin or greases containing rosin. They weaken the belt and shorten its period of service. Do not use belt dressings excessively, as they will cause undue stretching and loss of grip. Belts should never feel or look greasy. They should never be more greasy than they were when installed.

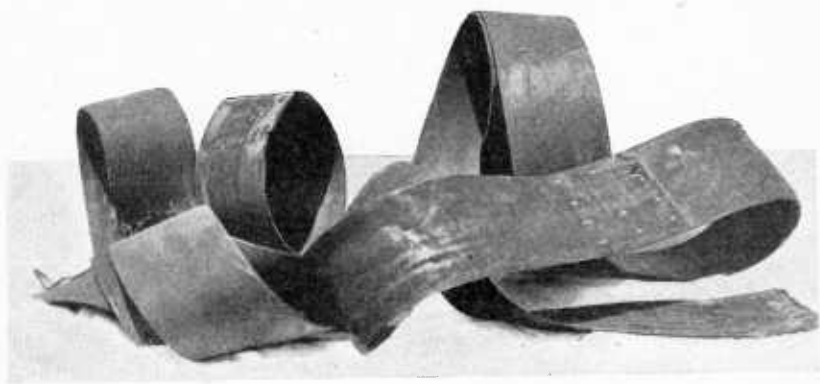


FIG. 13.—Effect of Proper Care on Leather Belting.

This belt, which has been kept in good condition, has run every day for 27 years in a country mill. Even now, when it breaks, it usually is where it has been riveted, and not where it is laced or glued.

BOOKBINDING AND BAG LEATHER.

Leather should not be used for bookbinding or traveling bags unless it is known to contain little if any mineral or oxalic acid. A small percentage of these will rot the leather in a few years. Bookbinding and bag leathers have a tendency to dry out and become rather harsh, finally breaking at the hinge, if the leather along this line is not kept flexible by occasional greasing. For this

purpose ordinary vaseline has been found to be good, having the further advantage of causing little, if any, change in the color of the leather. This should be applied occasionally in small quantities, and should be rubbed in until all visible grease has disappeared. Book-binding leathers tanned with sumac or similar tanning materials are more durable than those tanned with hemlock bark or tanning materials of like nature.

MILDEWING OF LEATHER.

Any leather article is almost certain to mildew if kept in a warm, damp, and dark place, such as a closet, cellar, or stable. This mildewing probably will not reduce seriously the serviceability of the article, unless it is allowed to remain on the leather too long. It may, however, change the color appreciably, thus injuring the appearance. The simplest way to prevent mildewing is to keep the leather in a well-ventilated, dry, well-lighted place, preferably one exposed to the sunlight. Mildew can not make much headway in the sunshine. When mildew develops, it should be washed off with soap and warm water, or simply wiped off with a moist cloth, drying the leather well afterwards. These simple measures are preferable to the application in the home of preparations designed to prevent the growth of mildew.

